Dairy E-News

March 2015 Vol. 4, No. 1

Inside:

Calf Management

Jeremy Powell, Professor and Veterinarian
Animal Science

In today's dairy industry, calf health issues can be challenging and expensive. With a variety of housing and nutritional options available to the producer, calf management may be highly variable from farm to farm. However, remembering the four Cs to calf management can help simplify your focus and potentially provide opportunity for adjustments to calf management to minimize health risks and losses. The four Cs include **colostrum**, **calories**, **cleanliness** and **comfort**.

Colostrum

Colostrum contains large quantities of antibodies to help establish early immunity for the calf. Time is an important consideration when dealing with colostrum supplementation. The ability of the calf to absorb colostrum decreases over the first 24 hours of its life. When the calf is born, its intestinal tract is very porous and easily allows absorption of colostrum, but with the passage of time, the ability of the intestine to absorb colostrum disappears. Ideally, you want to administer colostrum within four hours of birth, and dairy calves should be given approximately 4 quarts of colostrum, which is typically given in a couple of feedings. Colostrum should be collected from mature, disease-free cows and fed fresh if possible.

Calories

Until weaning, nutrient sources may include milk replacer, regular or waste milk or a combination of these. Calves should receive a daily volume of fluid and milk product approximately equal to 10 percent of their total body weight. Be sure to stay consistent with feeding times and total solids in the feed. Never make a greater than 1 percent change in total solids per day. In order to provide sufficient energy during cold weather exposure, an extra amount of 10 to 15 percent more milk should be fed.

Cleanliness

Make an effort to capitalize on environmental and equipment sanitation. This effort should start with the maternity pen. Before calving, remove manure and old bedding from the pen, disinfect the pen floor if needed and also provide fresh, clean bedding. Minimize traffic flow from adult areas to calf pens. Also, be sure to sanitize boots and disinfect calf bottles, buckets and feeders. Milk bottles and buckets should be cleaned daily. Wash equipment in hot water and detergent and rinse in hot water. Use a brush to remove debris and residue.

Comfort

When addressing calf comfort, consider seasonal changes. Cattle housed within their critical temperature range (55-75 degrees F) are more comfortable and will expend less energy to keep warm, allowing more energy to be put towards growth and immunity. Deep, clean bedding should be provided and is especially important to minimize heat loss during cool periods. Always provide plenty of fresh drinking water. A comfortable calf will be a more productive calf.

UofA
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Regardless of the size of your dairy operation, well-organized calf management will optimize the health and productivity of your calves.

For more information about calf management and other dairy cattle management tips, contact your county Extension office.

Fertilization of Alfalfa Stands

Dirk Philipp, Assistant Professor - Forages
Animal Science

Alfalfa stands can produce high yields with several cuttings per year, but the right conditions have to be present to use the full potential of this forage cash crop. Fertilization is one of the most important aspects in crop production, as the high yields generated require nutrient imports on a large scale. Apart from following soil test recommendations, there are several factors that affect long-term nutrient use efficiency.

The first step is selecting the proper site for a planned alfalfa field. Soils should be well drained, and soil samples should be taken after ground work is done to determine fertilizer and liming needs. NRCS soil maps and data should be consulted to find out how water infiltration and drainage rates might look. Even slight drainage problems can result in waterlogging during certain times of the year that leave uneven stands with weakened spots where weeds can encroach. This won't be a problem with herbicide-resistant alfalfa, but bare spots with no soil cover will nevertheless remain. It is advisable to obtain an early soil test to judge liming requirements before any tillage or disking is done. Low pH values cannot be corrected in the short term. It will take at least six months or longer before changes in pH will be noticeable. The good thing is that with enough planning, lime can be incorporated while doing the tillage work and that can take place months in advance. Proper seed planting techniques are a must, obviously including the use of certified inoculated seed material adapted to your climatic region.

Once the alfalfa is established, the quality of management, including fertilization, will determine longevity and yield. Here are few comments regarding the most important macro- and micronutrients:

Nitrogen

Alfalfa obviously fixes nitrogen, and if using inoculated seeds, N-fixation should occur reliably and at high rates. Research has shown that alfalfa is among the legumes with the highest N-fixing potential, and even very high-yielding stands apparently derive all N needed from N-fixation. Likewise, most research has shown that deliberately applying N will not increase yields and will sometimes even reduce yields. However, there are instances where record yields were achieved under high N fertilization and high irrigation amounts. For the eastern U.S., this scenario is of hypothetical value only.

Potassium and Phosphorus

Alfalfa removes large amounts of both P and K, about 15 and 60 pounds/ton harvested dry matter. What should not be overlooked is the fact that if soil test P and K are relatively low, high yields may not be achieved with just supplying predicted plant uptake amounts over the entire season. In soils with low P and K tests, plant uptake may be hindered because some of the fertilizer applied may be converted to unavailable forms in the soil.

There are a few additional factors that affect nutrient uptake – soil pH, temperature, soil compaction, soil oxygen and general root health. It is well known that low or high pH makes P less available or even unavailable to plants. Low soil temperatures can lower P uptake; also important is that high soil compaction will obviously restrict root growth with the result that roots will not be able to reach beyond the immediate root zone to obtain additional P. If soil oxygen is low, P-uptake is impeded, but this risk can be minimized with proper site selection. This is also important for K, as plant-availability of this mineral is usually improved with improved drainage and aeration.

Micronutrients

The two minerals to which alfalfa responds the most are boron and copper. Other than P and K, it is not useful, however, to "build up" these elements in the soil, as only small amounts are needed by the alfalfa plant. It should be noted that micronutrient availability is reduced above a pH of 7, so monitoring pH values will save money in the long run. Also, soil test results may not exactly indicate what the plant actually needs. Some practitioners, therefore, recommend plant tissue analysis to pin down the actual need for micronutrients. Also, correcting deficiencies of micronutrients will be difficult if macronutrients are not supplied to alfalfa in the required amounts.

Understanding Silage Preservation Characteristics

Shane Gadberry, Associate Professor
Animal Science

Corn silage or grass haylage is often analyzed to determine moisture and nutrient composition for accurate diet formulation. With silage or haylage, there are additional tests that can be valuable for evaluating the preservation attributes. Creating a link between conditions at harvest-storage and preservation attributes is beneficial for modifying future crop management, harvest and storage practices. The following sampling recommendations and tests to evaluate silage and haylage preservation characteristics are available through commercial laboratories.

Time

The first consideration in evaluating silage preservation is waiting a sufficient amount of time between storage and sampling. Silage is generally considered stabilized once pH has dropped to a level to prevent further bacterial activity until air exposure. Silage will generally stabilize in two to three weeks. Therefore, wait at least 28 days before evaluating preservation attributes of stabilized silage. If there is concern over changes in forage quality due preservation management, an initial sample prior to storage can be collected and analyzed for nutrient composition comparison to the preserved sample.

Sampling Handling

The second consideration in evaluating silage for preservation attributes or nutrient composition for ration balancing is handling the sample in a manner to minimize change between sampling and laboratory analysis. For sampling, place samples in a zip seal plastic-type bag and press out as much air as possible before sealing (vacuum seal if possible). With round bale silage, use a core-type sampler. Store samples in the freezer to minimize microbial action due to sample exposure to the air during collection. Ship samples, preferably overnight, with cold packs at the beginning of the week. Consider taking a sub-sample, and use the microwave test procedure with the sub-sample for immediate dry matter determination.

Dry Matter Test Results

Dry matter at the point of harvest and storage is a key component of preservation. Too much moisture can result in seepage losses and clostridial fermentation, whereas too little moisture can result in incomplete fermentation, heating and aerobic fermentation, as dryer material will not pack and exclude air to the extent of wetter material. Moisture targets are 60 to 65 percent for corn silage and 50 to 60 percent for grass silage.

pH Test Results

pH is a measure of acidity. It is the reduction in pH that is responsible for stabilizing silage by ceasing anaerobic activity. Corn silage will typically have a pH no greater than 4.2, whereas grass silage will have a pH of 4.2 to 5.0. Greater pH is generally associated with dryer silages, silages with less fermentable sugars and silages that have a high buffering capacity due to high protein or ash (mineral) content. Legume crops are known for their ensiling difficulty due to the high buffering capacity associated with high protein content.

VFA Profile Test Results

When aerobic bacteria digest plant material, oxygen is consumed and carbon dioxide is produced. Bacteria that thrive in an anaerobic environment generally produce acids instead of carbon dioxide as a product of digestion. These acids are responsible for the drop in pH and stabilization of silage. A VFA (volatile fatty acid) profile measures the concentration of lactic acid (most responsible for stabilization), acetic acid, propionic acid and butyric acid. The ratio of lactic acid to acetic acid may also be reported.

Acetic, propionic and butyric acid are end products of bacterial digestion in the anaerobic environment of the rumen, thus allowing silages to be a suitable method of preserving high moisture feedstuffs for ruminants. Ideally, lactic acid should represent 60 percent or more of the total acid content, and the ratio of lactic acid to acetic acid should be greater than 2:1. Some grass silage inoculants may elevate acetic acid to above normal (noninoculated) levels. This is considered normal.

The higher actetate due to inoculant is not considered detrimental to preservation and feedout. Silages that are high in butyric acid (> 0.5 percent DM) indicates a clostridial fermentation and is often characterized by higher fiber levels, high silage moisture and consequently reduced animal performance. Carcasses of small game and other wildlife unknowingly collected during crop harvest and accumulation for storage may be the cause of clostridial fermentation.

Ammonia Test Results

Clostridial fermentation or conditions that reduce the rate of pH decline and prolong the time to reach silage stability can increase silage ammonia concentration to an excessive level (> 12 percent DM). A high ammonia concentration may also be indicative of inadequate packing. High ammonia in the diet may not necessarily be detrimental to performance when rumen degradable nitrogen is balanced with rumen degradable carbohydrates. Milk test for urea nitrogen can help determine if rumen degradable nitrogen is excessive compared to the amount of rumen degradable carbohydrates provided. Keep in mind that much of the rumen degradable carbohydrate content of the diet is from structural plant sugars (fiber).

Silage fermentation profiles can be a useful tool for troubleshooting harvest and storage management issues that affect silage quality and shelf life. Silage quality, independent of nutrient composition, can affect animal performance through reduced feed intake. One common misconception about harvest options for grass is the assumption that putting grass up as silage results in better forage quality. There are times the hay equivalent will be better because excessive plant maturity at harvest results in too great of dry matter, reduced fermentable sugars, poor air exclusion, prolonged pH drop, heating and greater yeast growth when stored as haylage.

A silage fermentation test result will often accompany an interpretative summary. For assistance with interpreting results or troubleshooting harvest and storage issues, visit your local Extension office.

Management Considerations for Holstein Heifer Development

Michael L. Looper, Professor and Head
Animal Science

The purpose of the heifer herd is to provide replacements for cows leaving the herd and to improve genetics. First-lactation cows significantly contribute to herd production and profit. A recommended goal for replacement heifers is to calve at 24 months of age with a targeted postcalving body weight of 1,250 pounds. A common misconception is that this goal is either unattainable or uneconomical. Feeding heifers for rapid gains costs more per day than feeding for low gains, but development of replacement heifers is an investment in the future. The replacement heifer program should rear heifers to reach a desired age and body weight at a minimum cost.

Why 24 Months of Age?

It is well established that heifers should be between 23 and 26 months of age at first calving. Heifers that calve early spend more of their life producing milk than heifers that calve late. A large investment is required to rear heifers from birth to calving. The earlier heifers enter the milking herd, the sooner the return on this initial investment. Greater age at first calving dramatically increases herd costs. An extra day to first calving is estimated to cost 13 times as much as an extra day open. The number of replacements needed to maintain herd size increases when calving is delayed. Assuming a 30 percent cull rate, increasing age at first calving from 24 to 28 months requires 11 percent more heifers to maintain herd size on a 100-cow dairy.

Why 1,250 Pounds After Calving?

Research indicates Holstein heifers calving between 1,195 and 1,250 pounds have the greatest first-lactation milk yield. For example, a first-lactation cow that weighs 1,250 pounds produces 1,775 pounds more milk than a first-lactation cow calving with a weight of 900 pounds or less. Calving weight had a greater impact on first-lactation performance than did calving age, suggesting heifers should be bred by weight, not age. Heavier heifers produce more milk than smaller heifers because they have less growth remaining to reach mature body size, so nutrients can be used for milk production instead of growth. Smaller heifers also may take in less feed at the feed bunk due to competition from heavier, more aggressive heifers. In contrast, over conditioned heifers also perform poorly. Fat heifers can be predisposed to fatty liver, which can lead to ketosis and reduced feed intake. Over-conditioned heifers also have low lactation performance and a high incidence of difficult labor.

Age at onset of puberty is positively related to body weight. Sexual maturity of Holstein heifers begins at approximately 550 to 650 pounds, independent of age. Consequently, nutrition has a dramatic effect on age at puberty and first breeding. Too little or too much body weight gain during this growth period is a problem. Low weight gain before breeding is an obvious problem because it delays puberty, breeding and calving. Average daily gains between 1.5 and 1.7 pounds are necessary to achieve a breeding weight goal of 800 pounds at 14 months of age for heifers. Therefore, an average daily gain below 1.5 pounds for heifers is unacceptable and costly because it delays sexual maturity.

Gains greater than 2.0 pounds/day for heifers prior to puberty also are risky. Holstein heifers fed diets to gain 2.8 pounds/day had larger mammary glands, but less total secretory tissue due to increased mammary fat tissue than heifers gaining 1.4 pounds. Further research is needed to recommend rates of gain exceeding 1.8 pounds/day for prepubertal heifers. The recommendation for average daily gains for growing heifers prior to puberty is between 1.5 and 1.8 pounds/day. It is essential that body weight gains and wither heights of heifers be monitored due to the narrow window of recommended gains (1.5 to 1.8 pounds/day). A weight tape and a wither height stick can be used to periodically monitor heifer performance. Due to the large variation among heifers, producers should monitor groups, not individuals.

During gestation, average daily gain must be 1.7 to 2.1 pounds if heifers were bred at 750 to 850 pounds. Body weight gains above 2.0 pounds/day are acceptable for bred heifers during the first 6 to 7 months of gestation. Body weight gains in excess of 2.0 pounds/day should be avoided one to two months prepartum to prevent calving and postpartum problems because fetal and mammary growth accelerates during this time. Also, excessive body condition (> 4.0 on a 5-point scale) at calving can lead to postpartum health problems.

For replacement heifers to calve at 1,250 pounds and at 23 to 24 months of age, producers must monitor gains and routinely evaluate feed rations. Monitoring performance and balancing rations to provide adequate but not excessive nutrient intake will help ensure well-grown heifers that perform to their potential. Proper management of the heifer herd is one area on most dairy operations in which production costs can be reduced and herd productivity and profitability increased.